IN THE CLAIMS:

Please CANCEL claims 1-8 without prejudice to or disclaimer of the recited subject matter.

Please ADD new claims 9-16, as follows. Please note that all claims currently pending in this application are reproduced below for the Examiner's convenience.

1-8. (Canceled)

9. (New) An exposure method for projecting, through a projection optical system, a predetermined pattern formed on a mask onto an object to be exposed, said exposure method comprising the steps of:

dividing an effective light source area for illuminating the mask into plural point light sources;

calculating a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial for all divided point light sources;

determining an effective light source distribution based on a combination of Zernike sensitivity coefficient of all the divided point light sources; and

forming the effective light source distribution by intensity of each point light source.

10. (New) An exposure method according to claim 9, wherein said calculating step repeats for a combination of all the plural point light sources and the Zernike coefficient.

11. (New) An exposure method according to claim 9, wherein said determining step determines the effective light source using a combination of the point light sources while changing intensity of the point light sources and maintaining image quality of the predetermined pattern.

12. (New) An exposure method according to claim 9, wherein the wave front aberration includes residual aberration in the projection optical system.

13. (New) An exposure apparatus comprising:

a projection optical system for projecting a predetermined pattern formed on a mask onto an object to be exposed;

an illumination optical system for varying an effective light source distribution for illuminating the mask; and

a controller for forming the effective light source shape based on a combination of a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial for plural point light sources

that divide an effective light source area for illuminating the mask by intensity of each point light source.

14. (New) A database suitable for an exposure method for projecting, through a projection optical system, a predetermined pattern formed on a mask onto an object to be exposed, said database indicating a combination of a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial for plural point light sources that divide an effective light source area for illuminating the mask by intensity of each point light source.

15. (New) A program that enables a computer to execute an exposure method for projecting, through a projection optical system, a predetermined pattern formed on a mask onto an object to be exposed,

wherein said exposure method includes the steps of:

dividing an effective light source area for illuminating the mask into plural point light sources;

calculating a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial for all divided point light sources;

determining an effective light source distribution based on a combination of Zernike sensitivity coefficient of all divided point light sources; and

forming the effective light source distribution by intensity of each point light source.

16. (New) A device fabrication method comprising the steps of:

exposing an object using an exposure apparatus; and

performing a predetermined process for the object exposed,

wherein the exposure apparatus includes:

(i) a projection optical system for projecting a predetermined pattern formed on a mask onto an object to be exposed;

(ii) an illumination optical system for varying an effective light source distribution for illuminating the mask; and

(iii) a controller for forming the effective light source shape based on a combination of a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial for plural point light sources that divide an effective light source area for illuminating the mask by intensity of each point light source.